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# THE PELAGIC COPEPODS OF THE IZU REGION, MIDDLE JAPAN SYSTEMATIC ACCOUNT IV.

## FAMILY AETIDEIDAE (PART 2)

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*With 21 Text-figures*

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### Family AETIDEIDAE

#### Genus *Gaidiopsis* A. SCOTT, 1909

A. SCOTT created the genus *Gaidiopsis* to accomodate a single species, *Gaidiopsis crassirostris*, which differs from *Gaidius* in the followings: last two thoracic segments completely separate; exopodite of first leg 3-jointed; endopodite of second leg distinctly 2-jointed. I have, up to present, found no specimen belonging to the genus from the Izu region.

#### Genus *Gaetanus* GIESBRECHT, 1888

Up to the present time two species of this genus have been recorded from the Japanese waters: they are *G. armiger* GIESBRECHT and *G. minor* FARRAN. I have found three more species in the collection: *Gaetanus kruppi* GIESBRECHT, *G. miles* GIESBRECHT and *G. pileatus* FARRAN. The genus resembles *Gaidius* in general structure: head has a median spine; first antenna 24-jointed; second antenna with endopodite which is shorter than exopodite; mandible, maxillae and maxillipede as those of *Gaidius*; exopodite of first leg 2-jointed or sometimes 3-jointed; fourth leg with spines on inner margin of first basal joint; fifth leg absent in female; fifth pair of legs of male resemble those of *Gaidius*.

#### *Gaetanus kruppi* GIESBRECHT

(Fig. 41, a-g)

*Gaetanus kruppi* GIESBRECHT, 1904, p. 202; A. SCOTT, 1909, p. 48; WITH, 1915, p. 97; G. O. SARS, 1925, p. 61; FARRAN, 1926, p. 249; SEWELL, 1929, p. 102; WILSON, 1932, p. 52; JESPERSEN, 1934, p. 62; SEWELL, 1947, p. 62.

*Female.* Length, 4.95 mm : cephalothorax, 3.95 mm ; abdomen, 1.00 mm. Cephalothorax rather slender, about 2.9-times as long as wide. Forehead with a median spine directing forwards and slightly downward (fig. *a*, *b*). Rostrum short. Lateral spines of last thoracic segment slightly divergent, reaching the middle of genital segment (fig. *c*).

Abdomen 4-segmented ; segments and furca with proportional lengths 42:17:12:12:17=100 ; furcal rami a little longer than wide.

First antenna 24-jointed, extends beyond distal end of abdomen by last three joints ; joints are in the proportional lengths :

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	56	34	16	19	25	25	28	47	22	25	28	53	50	56	53	56
	18	19	20	21	22	23	24	25								
	53	65	59	50	65	56	40	19=1000 ;								

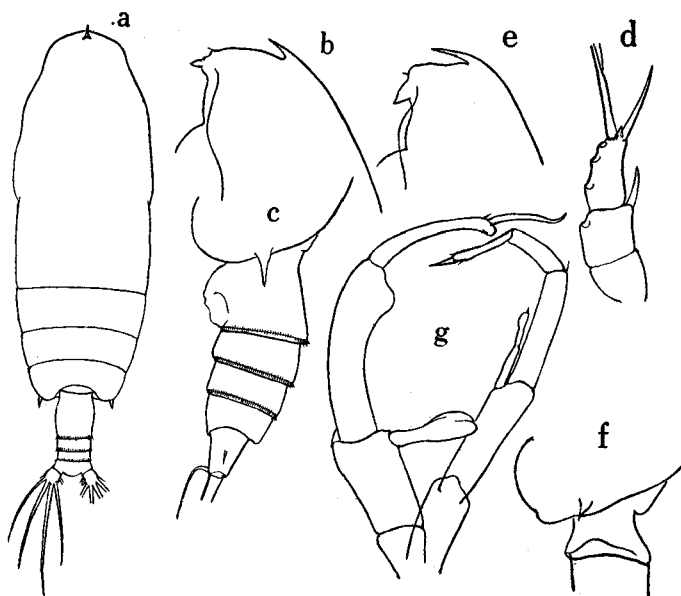


Fig. 41. *Gaetanus kruppi* GIESBRECHT.

*a*, Female: dorsal aspect ; *b*, head, lateral aspect ; *c*, last thoracic segment and abdomen, lateral aspect ; *d*, exopodite of first leg ; *e*, Male: head, lateral aspect ; *f*, last thoracic segment, lateral aspect ; *g*, fifth pair of legs.

WITH describes that joints 2, 8-9 and 20 are of about equal lengths, but in the present specimen the 20th is the longest. Second antenna with exopodite about 1.2-times as long as endopodite ; distal joint of endopodite bears 14 setae. Mandible has a small exopodite. First maxilla with 7+2 setae on outer lobe, 11 setae on exopodite, 4+4+7 setae on endopodite, 5 setae on second basal, 4 setae on third inner lobe, 4 setae on

second inner lobe; third inner lobe has, beside 4 setae, a conical process. Second maxilla not characteristic. Maxillipede with a lamellous process on the middle of the anterior surface of first basal joint.

First leg with an articular membrane between first and second joints of exopodite (fig. *d*). Second leg has 20 teeth on terminal spine of exopodite; teeth are connected by a sort of lamella; endopodite 2-jointed. Third leg with 21 teeth on terminal spine of exopodite. Fourth leg has 14 stiff triangular pointed marginal bristles on posterior surface of first basal joint.

*Male*. Length, 4.87 mm: cephalothorax, 3.75 mm; abdomen, 1.12 mm; the greatest width of cephalothorax, 1.38 mm. Cephalothorax more slender than that of the female. Cephalic spine slender and long (fig. *e*). Rostrum more clumsy. Lateral spines of last thoracic segment shorter (fig. *f*).

Abdomen 5-segmented; segments and furca with proportional lengths 20:28:22:15:3:12=100; furcal rami about as long as wide.

First antenna extends to the middle of third abdominal segment; the segmentation in 8th to 14th joints are, as stated by WITH, difficult to make out; joints are in the proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	55	32	20	20	24	28	32	52	16	28	26	24	24	55	55	60
	18	19	20-21	22	23	24-25										
	60	72	120	75	72	60=1000.										

Second antenna has exopodite about as long as endopodite; first joint of exopodite is furnished with hairs on the posterior margin; first joint of endopodite rather clumsy. Mandible has a broad second basal joint furnished with a single short seta; both exopodite and endopodite well developed; First maxilla slightly reduced; outer lobe has 7, long setae and 2 short ones; exopodite has 11 setae; endopodite has 5+2+2 setae; second basal joint has one long and 2 short setae. Second maxilla much reduced and soft-skinned. Maxillipede has no lamellous process on first basal as observed in the female; distal part of first basal joint is produced into a claw-like lamellous process.

In first leg, outer edge spine of second joint of exopodite is represented by a minute spinule. Terminal spine of exopodite of second leg has 29 to 34 teeth, that of third and fourth leg have each 28 and 30 teeth respectively. Fifth pair of legs as described by WITH, but the small process at base of third joint of exopodite of left leg was not observed in the present specimen (fig. *g*).

*Occurrence*. Six females and three males from Sagami, Nov. 1937, one female from Suruga, Dec. 1937, from 1000 to the surface.

*Distribution*. The species is widely distributed in the deep waters of the Atlantic, Pacific and Indian Oceans.

*Gaetanus armiger* GIESBRECHT(Fig. 42, *a-d*)

*Gaetanus armiger* GIESBRECHT, 1892, p. 219; A. SCOTT, 1909, p. 45; SARS, 1925, p. 59; SEWELL, 1929, p. 101; MORI, 1937, p. 40.

*Female*. Length, 3.37 mm: cephalothorax, 2.62 mm; abdomen, 0.75 mm. Cephalic spine slender and short, directing forwards (fig. *a*). Rostrum small; frontal prominence low (fig. *b*). Lateral spines of last thoracic segment divergent, and extend beyond the middle of genital segment. Articulation between fourth and fifth thoracic segments slightly visible in dorsal aspect (fig. *c*).

Abdomen 4-segmented; segments and furca with proportional lengths 52:22:19:15:22=100. Genital segment as long as wide. Furcal rami about 1.2-times as long as wide.

First antenna 23-jointed, extends to distal end of third abdominal segment; proportional lengths of the joints:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	54	37	20	20	23	25	28	45	28	28	28	48	48	51	51	54
	18	19	20	21	22	23	24-25									
	54	65	57	51	62	57	68=1000;									

joints 24-25 are 1.05-times as long as joint 19; according to GIESBRECHT, joints 22 and 23 are of equal lengths, but in the present specimen joint 22 is 1.1-times as long as the 23rd. Second antenna with exopodite 1.2-times as long as endopodite. Maxillae as those of the preceding species. Maxillipede has no lamellous process on the distal margin of first basal joint.

Exopodite of first leg as shown in the figure (fig. *d*). Terminal spine of exopodite of second to fourth legs have 18, 18 and 27 teeth respectively; fourth leg bears 17 spines on inner margin of first basal joint at the base of inner marginal seta.

*Occurrence*. One adult female from Sagami, Nov. 1937, from 1000-0 m.

*Distribution*. The species has a wide distribution, and has been recorded from the Pacific, Atlantic, Indian Oceans, Malay Archipelago and the Gulf of Guinea.

*Gaetanus minor* FARRAN(Fig. 42, *e-g*)

*Gaetanus minor* FARRAN, 1905, p. 34; FARRAN, 1908, p. 37; A. SCOTT, 1909, p. 47; WOLFENDEN, 1911, p. 233; WITH, 1915, p. 103; SARS, 1925, p. 60; FARRAN, 1926, p. 250; SEWELL, 1929, p. 102; JESPERSEN, 1934, p. 62; FARRAN, 1936, p. 89; TANAKA, 1937, p. 257; SEWELL, 1947, p. 59.

*Length*. Female, 2.23 mm: cephalothorax, 1.82 mm; abdomen, 0.41 mm. Lateral spines of last thoracic segment reach about the end of genital segment (fig. *e, f*).

Abdomen 4-segmented; segments and furca with proportional length 44:17:13:9:17=100; furcal rami as long as wide; genital segment a little wider than long.

First antenna 23-jointed, reaches back to distal end of third abdominal segment; joints are in proportional lengths:

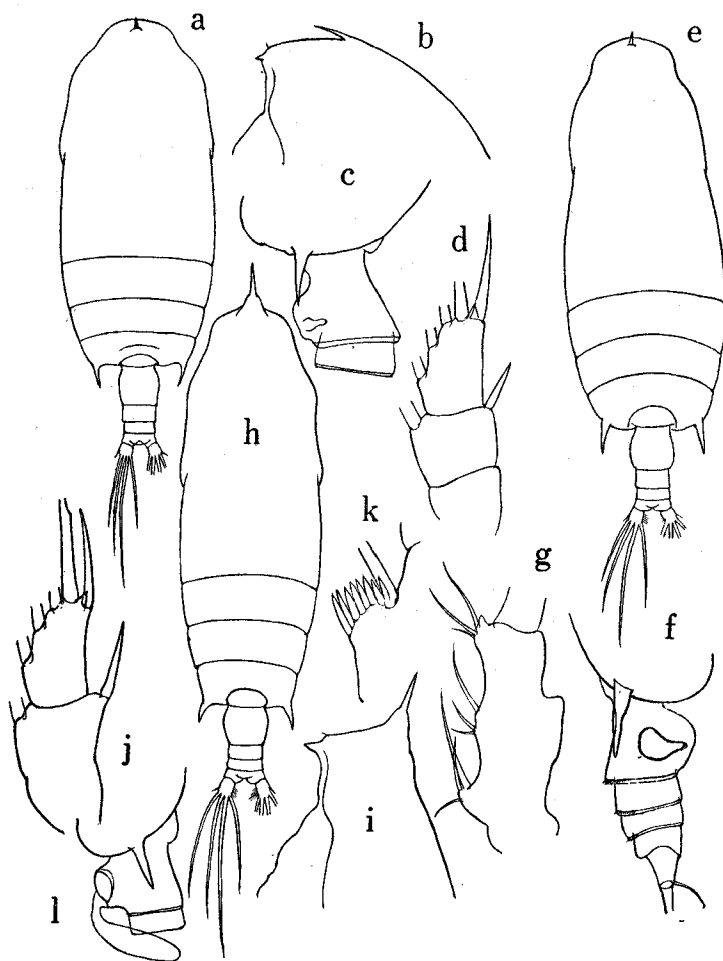


Fig. 42. *Gaetanus armiger* GIESBRECHT (a-d),  
*Gaetanus minor* FARRAN (e-g),  
*Gaetanus miles* GIESBRECHT (h-l).

a, *Gaetanus armiger*, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and genital segment, lateral aspect; d, exopodite of first leg; e, *Gaetanus minor*, Female: dorsal aspect; f, last thoracic segment and abdomen, lateral aspect; g, first basal joint of maxillipede; h, *Gaetanus miles*, Female: dorsal aspect; i, head, lateral aspect; j, exopodite of first leg; k, inner margin of first basal joint of fourth leg; l, last thoracic segment and genital segment, lateral aspect.

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	58	40	26	22	26	26	31	40	22	26	26	40	44	44	49	53
	18	19	20	21	22	23	24-25									
	53	69	57	44	67	57	53	27=1000;								

joints 19 and 22 are of about equal lengths. Second antenna with exopodite about 1.2-times as long as endopodite. In 1st maxilla second inner lobe carries, as described by WITH, two strong setae and short spine-like setae. Maxillipede with a lamellous process on first basal joint about the middle of posterior margin (fig. *g*).

First leg with 2-jointed exopodite. The number of teeth on terminal spine of second to fourth legs are 13, 15 and 13 respectively.

*Remarks.* I have previously collected an immature female specimen in the fifth copepodid stage from Suruga in the vertical haul from 500-250 m; the specimen measured 2.00 mm.

*Occurrence.* Six adult females from Sagami in the vertical hauls 1000-0 m, Nov. 1937.

*Distribution.* The species has a wide distribution, and has been reported from the North Atlantic, Indian Seas, Malay Archipelago and Great Barrier Reef region.

### *Gaetanus miles* GIESBRECHT

(Fig. 42, *h-l*)

*Gaetanus miles* GIESBRECHT, 1982, p. 219, t. 14, 36; FARRAN, 1908, p. 36; A. SCOTT, 1909, p. 44; WOLFENDEN, 1911, p. 231; WITH, 1915, p. 107; SARS, 1925, p. 54; SEWELL, 1929, p. 102, WILSON, 1932, p. 51; JESPERSEN, 1934, p. 61; FARRAN, 1936, p. 89; SEWELL, 1947, p. 58; BRODSKY, 1950, p. 168.

*Female.* Length, 3.96 mm: cephalothorax, 3.25 mm; abdomen, 0.71 mm. Cephalic spine long. Rostrum short. Lateral spines of last thoracic segment divergent, and extend beyond the middle of genital segment (fig. *h, i, l*).

Abdomen is contained 4.6-times in the length of cephalothorax; abdomen 4-segmented, segments and furca with proportional lengths 41:15:13:13:18=100; genital segment wider than long; furcal rami as long as wide.

First antenna 23-jointed, about 2.6-times as long as total length of body; distal 10 joints exceeds end of furca; joints are in the proportional lengths;

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	20	19	12	12	16	18	21	42	25	30	32	46	48	58	62	67
	18	19	20	21	22	23	24-25									
	65	77	85	69	85	50	37=1000;									

according to GIESBRECHT joints 8-9, 13 and 24-25 are of equal lengths, but in the present specimen they agree with the description given by WITH: joint 13 is 1.1-times as long as joints 8-9, and 1.2-times as long as joints 24-25. Second

antenna with exopodite 1.2-times as long as endopodite. Outer lobe of first maxilla with 7+2 setae, endopodite with 11 setae, second inner lobe with 4 setae, third inner lobe with 4 setae and a small conical process. In maxillipede second basal joint 1.4-times as long as the first which is furnished with rounded lamellous process on the posterior margin.

In first leg outer edge spine of second joint of exopodite reaches almost the distal end of third joint of exopodite. Second leg has endopodite distinctly 2-jointed. First basal joint of fourth leg has knife-shaped spines on the inner margin (fig. *k*); the number of the spine is variable: according to GIESBRECHT, it is 6; A. SCOTT, 12; WITH, 15. Terminal spine of exopodite of second to fourth legs have 15, 17 and 16 teeth respectively.

*Occurrence.* One adult female from Sagami in the vertical hauls from 1000-0 m, Nov. 1937.

*Distribution.* The species has a wide distribution in the deep waters of the oceans.

### *Gaetanus pileatus* FARRAN

(Fig. 43, *a-f*)

*Gaetanus pileatus* FARRAN, 1905, p. 33; ESTERLY, 1906, p. 57; A. SCOTT, 1909, p. 46; WOLFENDEN, 1911, p. 229; WITH, 1915, p. 104; SARS, 1925, p. 56; SEWELL, 1929, p. 103; FARRAN, 1936, p. 89; SEWELL, 1947, p. 59.

*Female.* Length, 6.14 mm: cephalothorax including cephalic spine 4.95 mm; abdomen, 1.19 mm; the greatest width of cephalothorax 1.75 mm. Cephalic spine has a characteristic shape (fig. *a*, *b*). Lateral spines of last thoracic segment divergent, and extend to the middle of genital segment (fig. *c*).

Abdomen 4-segmented; segments and furca with proportional lengths 44:17:14:9:16=100. Genital segment which is as long as wide, shows a sudden change in the continuity of the outline at the proximal two-fifths of the dorsal surface. Furcal rami as long as wide.

First antenna broken off. Second antenna with exopodite about as long as endopodite. First maxilla with 7 long and 2 short setae on outer lobe; third inner lobe with 3 setae and a conical process as shown in the figure (fig. *d*). Maxillipede has first basal joint about as long as the second; first joint has a lamellous process with a rounded tip on the posterior margin (fig. *e*).

First leg with 2-jointed exopodite which has no articulation between first and second joints. Second leg with 3-jointed exopodite and 2-jointed endopodite; the number of teeth on terminal spine of second to fourth legs are 20, 20 and 23 respectively. First basal joint of fourth leg bears about 16 lamellous bristles on the inner margin (fig. *f*).

*Occurrence.* One adult female from Sagami in the vertical hauls 1000-0 m, Nov. 1937.



*Distribution.* The species has been recorded from the west coast of Ireland, South Atlantic, Malay Archipelago, Indian Ocean, Denmark Strait, North-East Pacific.

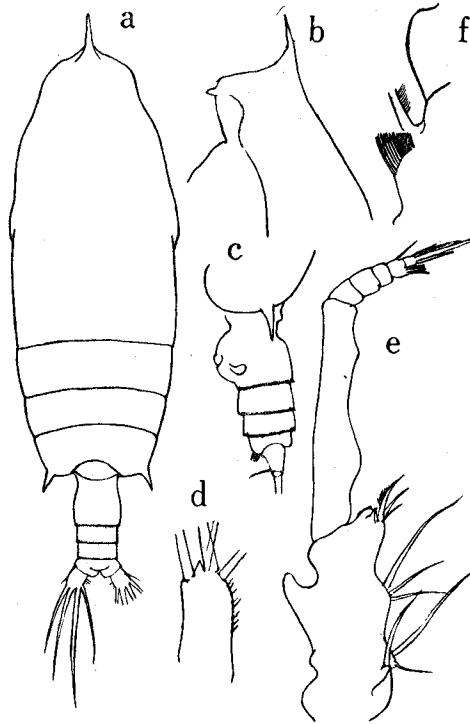


Fig. 43. *Gaetanus pileatus* FARRAN.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, exopodite, endopodite and lobes of first maxilla; e, first leg; f, first basal joint of fourth leg; g, Male: fifth pair of legs.

### Genus *Euchirella* GIESBRECHT, 1888

One species of this genus, *Euchirella amoena* GIESBRECHT, has been reported by MORI from Japanese waters. In the present collection I have found 9 species, of which two appear to be undescribed. The genus has the following characteristics: head usually separates from first thoracic segment; head with or without a crest; last thoracic segments fused; lateral corners of last thoracic segment rounded; rostrum usually present; abdomen 4-jointed in female; genital segment often asymmetrical; furcal rami about as long as wide; first antenna 23-jointed; endopodite of second antenna shorter than half the length of exopodite; second basal joint of first maxilla long; exopodite of first leg 2-jointed, those of the three following legs 3-jointed;

endopodite of first and second legs 1-jointed, those of third and fourth legs 3-jointed; first basal joint of female fourth leg has spines on the inner margin; fifth leg absent in female; male fifth pair of legs biramose on the right; left leg with a rudimentary endopodite. According to SARS the true member of the genus *Euchirella* are characterized by the reduction of joints of endopodite of second antenna, and by the reduction of the number of setae on endopodite of first maxilla.

*Euchirella rostrata* CLAUS

(Fig. 44, a-g)

*Euchirella rostrata* GIESBRECHT, 1892, p. 222; ESTERLY, 1905, p. 152; FARRAN, 1908, p. 38; SARS, 1935, p. 69; FARRAN, 1929, p. 234; WILSON, 1932, p. 55; JESPERSEN, 1934, p. 64; BRODSKY, 1950, p. 173.

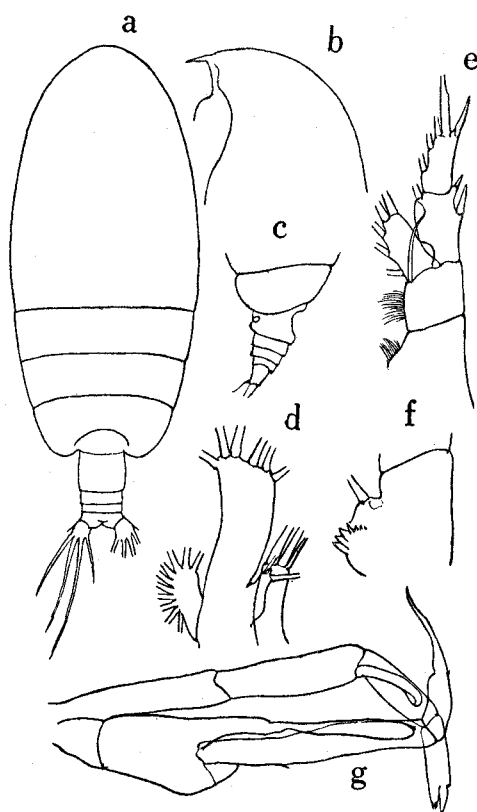


Fig. 44. *Euchirella rostrata* CLAUS.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, exopodite and endopodite and lobes of first maxilla; e, first leg; f, first basal joint of fourth leg; g, fifth pair of legs.

*Female.* Length, 3.58 mm: cephalothorax, 2.95 mm; abdomen, 0.63 mm. Cephalothorax robust (fig. *a*, *b*, *c*). Rostrum long and pointed. Abdomen 4-segmented; segments and furca in the proportional lengths: 43:16:14:8:19=100. Genital segment has a small ventral process. Furcal rami about as long as wide.

First antenna 23-jointed, extends to distal end of third abdominal segment; second joint is much shorter than joints 8-9. Second antenna has exopodite 2-times as long as endopodite. First maxilla has 3 setae on second inner lobe, 2 setae and a conical process on third inner lobe, 9 setae on outer lobe, 10 setae on exopodite, 4 setae on endopodite, 2 setae on second basal joint (fig. *d*).

First leg as figured by GIESBRECHT (fig. *e*). The number of teeth on terminal spine of exopodite of second to fourth legs are in the specimen examined:

	second	third	fourth
right leg	18	20	23
left leg	17	20	20

Fourth leg has triangular lamellous plates on first basal joint (fig. *f*).

*Male.* Length, 3.01 mm: cephalothorax, 2.38 mm; abdomen, 0.68 mm. Cephalothorax slender. Head incompletely separates from first thoracic segment. Abdomen 4-segmented; segments and furca in the proportional lengths: 26:20:17:13:7:17=100; furcal rami about as long as wide. First antenna extends to distal end of fourth abdominal segment; joints 9-10, and 12-13 are partially fused. Second antenna with endopodite about 3/4-times as long as exopodite; setae on second basal joint well developed. Fifth pair of legs differ from those of the other members of the genus: right leg does not form a complete prehensile organ; left leg well developed (fig. *g*).

*Occurrence.* Common species among the genus, both from the surface and the deep waters of the Izu region.

*Distribution.* It is widely distributed in the Pacific, Atlantic, Mediterranean and California coast.

### *Euchirella pulchra* (LUBBOCK)

(Fig. 45, *a-h*)

*Euchirella pulchra* GIESBRECHT, 1892, p. 233; A. SCOTT, 1909, p. 56; WILSON, 1932, p. 58; SEWELL, 1947, p. 80; VERVOORT, 1949, p. 20; BRODSKY, 1950, p. 175.

*Female.* Length, 3.47 mm: cephalothorax, 2.77 mm; abdomen, 0.70 mm. Cephalothorax ovate; forehead with a low crest; frontal organ prominent (fig. *a*). Rostrum short (fig. *b*). Abdomen 4-segmented; segments and furca in the proportional lengths: 52:15:13:5:15=100. Genital segment with a swelling on left side; right side is indented (fig. *c*). Furcal rami about as long as wide.

First antenna 23-jointed, extends about to distal end of third abdominal segment; joints are in the proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	45	39	23	21	24	21	24	39	27	30	27	48	48	65	63	69
	18	19	20	21	22	23	24-25									
	63	69	56	50	47	42	42=1000.									

Second antenna with exopodite 2.8-times as long as endopodite; second joint of endopodite with 6+6 setae. Mandible with exopodite about as long as endopodite. First maxilla as in *Euchirella messinensis* (fig. d). Maxillipede with two basal joints of about equal lengths; second joint has a row of spinules on the proximal anterior margin.

In first leg outer edge spine of third joint of exopodite about as long as the joint itself. Terminal spine of second to fourth legs have 20, 19 and 19 teeth respectively.

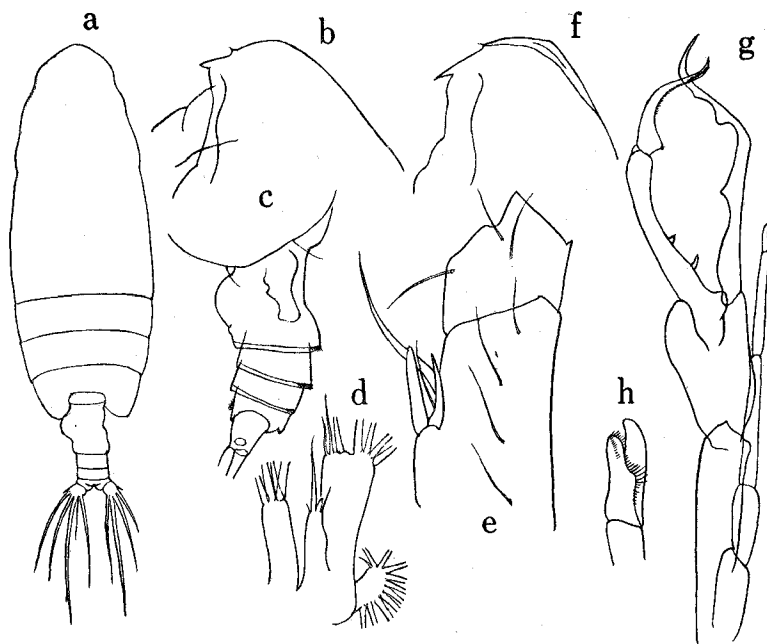


Fig. 45. *Euchirella pulchra* (LUBBOCK).

a. Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, exopodite, endopodite and lobes of first maxilla; e, basal joints of fourth leg; f, Male: head, lateral aspect; g, fifth pair of legs; h, distal joint of exopodite of left fifth leg.

First basal joint of fourth leg has two subequal spines at the base of inner marginal seta, and scattered bristles on first and second basal joints (fig. e).

*Male*. Length, 3.06 mm: cephalothorax, 2.35 mm; abdomen, 0.71 mm; so abdomen is contained 3.3-times in the length of cephalothorax. Forehead with a low crest (fig. f). Last two thoracic segments are fused. Rostrum one-pointed. Abdomen

5-segmented; segments and furca in the proportional length: 25:23:19:19:2:12=100; distal margin of second and third segments are fringed with teeth.

First antenna extends about to distal end of third abdominal segment; joints 8 and 9 are fused; joints 12 and 13 are incompletely fused. First maxilla with 3 short and long setae on outer lobe, 10 setae on exopodite, and 4 setae on endopodite.

First leg with 3-jointed exopodite; second joint of exopodite has a minute outer edge spine; articulation between first and second joints clearly observed on the anterior surface. Second leg has a completely fused endopodite. Fourth leg has no spine on inner distal margin of second joint; inner edge spine of first joint of endopodite has an accessory spine. Fifth pair of legs as figured by GIESBRECHT (fig. *g, h*).

*Occurrence.* Two adult females from Sagami, Nov. 1937, and one male from Suruga, Dec. 1937, from deep waters.

*Distribution.* The species appears to have a wide distribution; it has been recorded from the Pacific, Atlantic, Malay Archipelago, San Diego region, and Mediterranean Sea.

### *Euchirella messinensis* (CLAUS)

(Fig. 46, *a-g*)

*Undinella messinensis* CLAUS, 1863, p. 187; *Euchirella messinensis* GIESBRECHT, 1892, p. 232, t. 15, 36; A. SCOTT, 1909, p. 115; WOLFENDEN, 1911, p. 237; WITH, 1915, p. 122; SARS, 1925, p. 63; FARRAN, 1926, p. 253; SEWELL, 1929, p. 115; WILSON, 1932, p. 56; VERVOORT, 1949, p. 28; BRODSKY, 1950 p. 172.

*Female.* Length, 5.26 mm: cephalothorax, 4.07 mm; abdomen, 1.19 mm. Rostrum rather slender and acute, directs downwards (fig. *a, b*). Abdomen 4-segmented; segments and furca in the proportional lengths 49:18:12:6:15=100; dorsal protuberance of genital segment differs from the figure given by GIESBRECHT or SARS: it is much smaller and exceeds slightly the distal margin of genital segment, and situated rather on the middle of the dorsal surface (fig. *c*).

First antenna extends to the middle of second abdominal segment. Mouth parts and swimming legs as those of the foregoing species; endopodite of first maxilla has 4 setae. Fourth leg with two spines on the inner margin of first basal joint; terminal spine of the exopodite has 20 teeth (fig. *d*).

*Male.* Length, 4.62 mm: cephalothorax, 3.37 mm; abdomen, 1.25 mm; abdomen is contained 2.7-times in the length of cephalothorax. Forehead with low crest. Rostrum moderately long (fig. *e*). Lateral corners of last thoracic segment rounded. Second and third abdominal segments are furnished with coarse teeth on the distal margin.

First antenna 22-jointed, extends to the middle of second abdominal segment; proportional lengths of joints are as follows:

Joint	1	2	3	4	5	6	7	8-9	10	11	12-13	14	15	16	17
	37	45	22	22	25	22	30	40	27	30	75	47	70	42	75
	18	19	20	21	22	23	24-25								
	65	75	60	47	52	45	47=1000;								

joints 24-25 are 1.06-times as long as the 23rd; but they are 4-times in *Euchirella pulchra*; joint 18 is shorter than the 17th in the present specimen, but it is of about equal length in *E. pulchra*. Mouth parts and first to third swimming legs as those of *E. pulchra*. In fourth leg second basal joint has two minute spines near the inner distal margin. Fifth pair of legs resemble those of *E. pulchra*, but endopodite of right leg is longer than the combined lengths of two basal joints (fig. f, g).

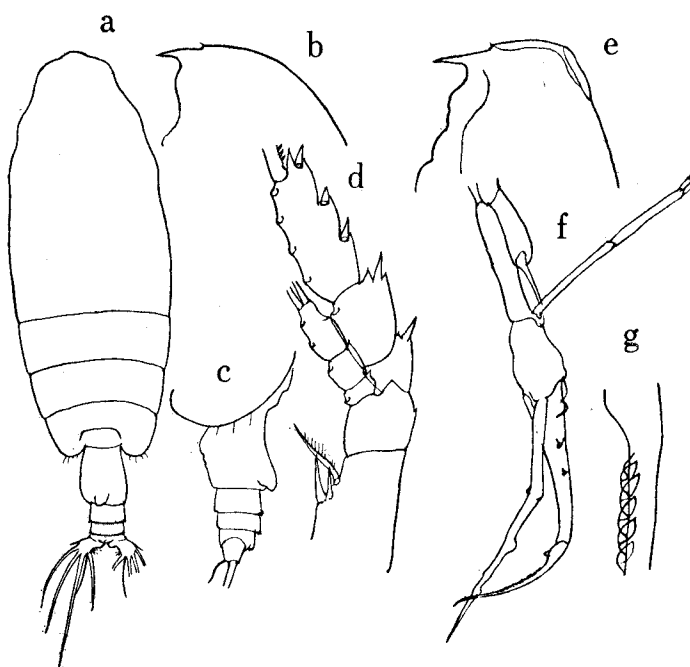


Fig. 46. *Euchirella messinensis* (CLAUS).

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, fourth leg; e, Male: head lateral aspect; f, fifth pair of legs; g, a part of distal joint of exopodite of right fifth leg.

**Occurrence.** One of the most common species in the deep water of Sagami and Suruga Bay.

**Distribution.** The species is widely distributed in the deep waters of the Pacific (San Diego), Atlantic, Indian Oceans, also from the Mediterranean and Malay Archipelago.

*Euchirella venusta* GIESBRECHT

(Fig. 47, a-g)

*Euchirella venusta* GIESBRECHT, 1892, p. 336; A. SCOTT, 1909, p. 57; FARFAN, 1929, p. 237; SEWELL, 1947, p. 85; VERVOORT, 1949, p. 20.

*Female*. Length, 4.88 mm: cephalothorax, 3.88 mm; abdomen, 1.00 mm. General appearance as in *E. messinensis* (fig. a, b, c). Abdominal segments and furca in the proportional lengths 54:13:11:5:18=100. Genital segment asymmetrical; there is a remarkable protuberance on the left side of the segment; the proximal dorsal surface is hollowed; the ventral protuberance situated anterior to the genital opening is very prominent. Furcal rami about as long as wide.

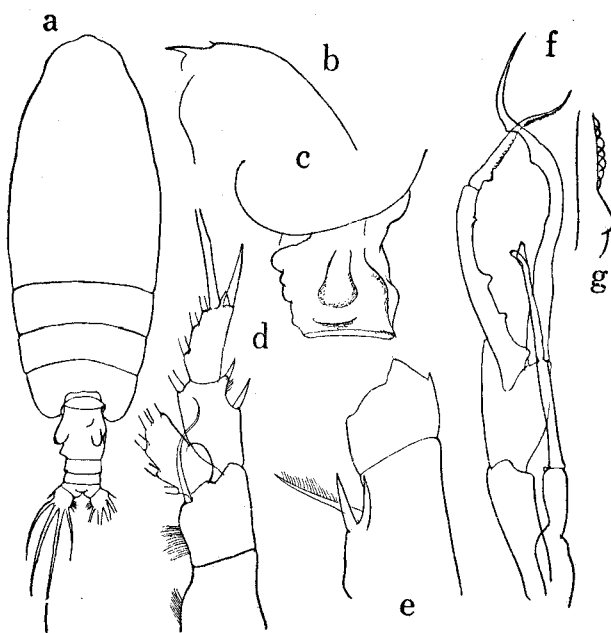


Fig. 47. *Euchirella venusta* GIESBRECHT.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and genital segment, lateral aspect; d, first leg; e, basal joints of fourth leg; f, Male: fifth pair of legs; g, a part of distal joint of exopodite of right fifth leg.

First antenna 23-jointed, extends to distal end of genital segment; joints are in the proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	45	48	23	20	23	20	23	36	24	28	28	48	50	68	64	72
	18	19	20	21	22	23	24-25									
	64	68	60	48	44	38	48=1000.									

Second antenna with exopodite about 3.4-times as long as endopodite. Mandible blade is robust and has a long inner edge seta. First maxilla has 11 setae on exopodite, 4 setae on endopodite, 6 setae on outer lobe, 3 setae on second basal joint. Second maxilla without characteristic features. Maxillipede as that of *E. messinensis*; outer margin of second basal joint has two swellings on the distal half of the joint.

First leg has 2 outer edge spines on outer margin of first joint of exopodite as in other members of the genus (fig. *d*).

Terminal spine of exopodite of second to fourth legs have 20, 21 and 20 teeth respectively. Fourth leg has two spines reaching the proximal margin of second basal joint on the inner margin of first basal joint at the base of inner marginal seta (fig. *e*).

*Male*. Length, 3.70 mm: cephalothorax, 2.95 mm; abdomen, 0.75 mm. General appearance as in the female. Head without crest. First antenna reaches back to distal margin of first abdominal segment. Fifth pair of legs closely resemble those of *E. messinensis* (fig. *f*, *g*).

*Occurrence*. Two adult females and a male from Suruga in the vertical hauls 1000–0 m, July, 1937.

*Distribution*. The species has been recorded from the Atlantic, and Malay Archipelago.

### *Euchirella intermedia* WITH

(Fig. 48, *a–f*)

*Euchirella intermedia* WITH, 1915, p. 124; SARS, 1925, p. 68; VERVOORT, 1947, p. 28.

*Female*. Length, 6.19 mm: cephalothorax, 5.25 mm; abdomen, 0.94 mm. Cephalothorax ovate. Frontal margin of head produced triangularly. Articular membrane between head and first thoracic segment faintly visible; last two thoracic segments incompletely fused. (fig. *a*). Lateral corners of last thoracic segment rounded (fig. *c*). Rostrum slightly curved posteriorly; rostral spine slender (fig. *b*).

Abdomen is contained 5.6-times in the length of cephalothorax; segments and furca in the proportional lengths 51:12:8:15:13=100. Genital segment asymmetrical: the left side is in dorsal view more inflated about the middle of the segment; lateral distal corner of the left side has a process which is concave at the apical portion (fig. *d*).

First antenna 24-jointed, extends to distal end of furca. First maxilla has 5 setae on endopodite, 3 setae on second basal joint, of which two are very short (fig. *e*).

In fourth leg first basal joint has a single spine extending to the distal margin of the joint on the inner margin at the base of the inner marginal seta (fig. *f*).

*Remarks*. The species is easily recognised by the shape of genital segment, and a single strong spine on first basal joint of fourth leg. WITH's specimen measured 5.66 mm, SARS' 6.20 mm.



*Occurrence.* One adult female from Suruga in the depth 400–200m, March, 1940.

*Distribution.* The species has been recorded from the North Atlantic.

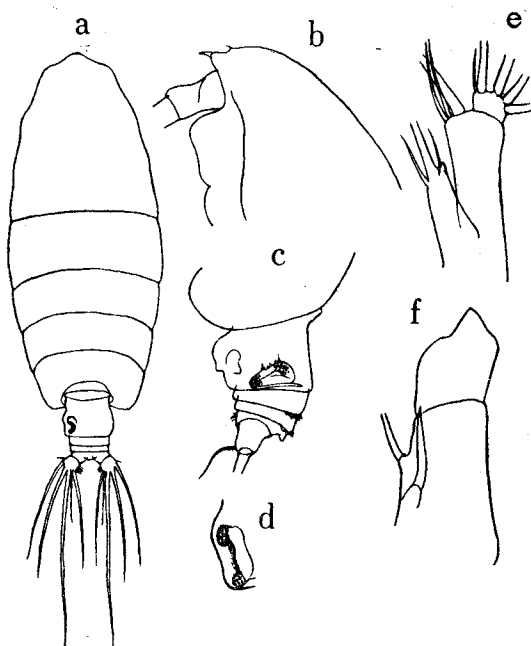


Fig. 48. *Euchirella intermedia* WITH.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, protuberance on left margin of genital segment; e, endopodite and lobes of first maxilla; f, basal joints of fourth leg.

*Euchirella trigrada* sp. nov.

(Fig. 49, a–h)

*Female.* Length, 5.23 mm: cephalothorax, 4.33 mm; abdomen, 0.90 mm; the greatest width of cephalothorax, 1.70 mm. General appearance as in *E. intermedia* WITH (fig. a). Head and first thoracic segment separate. Rostrum directs straight forwards; rostral spine moderately long (fig. b).

Abdomen 4-segmented; segments and furca in the proportional lengths 60:10:8:6:16=100. Genital segment which is as deep as wide is shorter than wide; the segment is in dorsal view slightly asymmetrical; there are on the left side 3 lamellous processes of which the distal two are broad at the base; there is a blunt process on the right side; genital area as that of *E. intermedia*. Furcal rami shorter than wide.

First antenna 23-jointed, reaches back to distal end of furca; joints are in the following proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	39	45	26	23	26	26	26	49	34	34	30	49	52	52	52	56
	18	19	20	21	22	23	24-25									
	67	75	56	45	49	38	52=1000;									

joints 3, 7, 9, 14 and 18 have each a long seta; aesthetascs are found on joints 9, 12, 14 and 19. Second antenna with exopodite about 3.7-times as long as endopodite; first basal joint has a tuft of hairs on the posterior surface (fig. *d*). First maxilla as

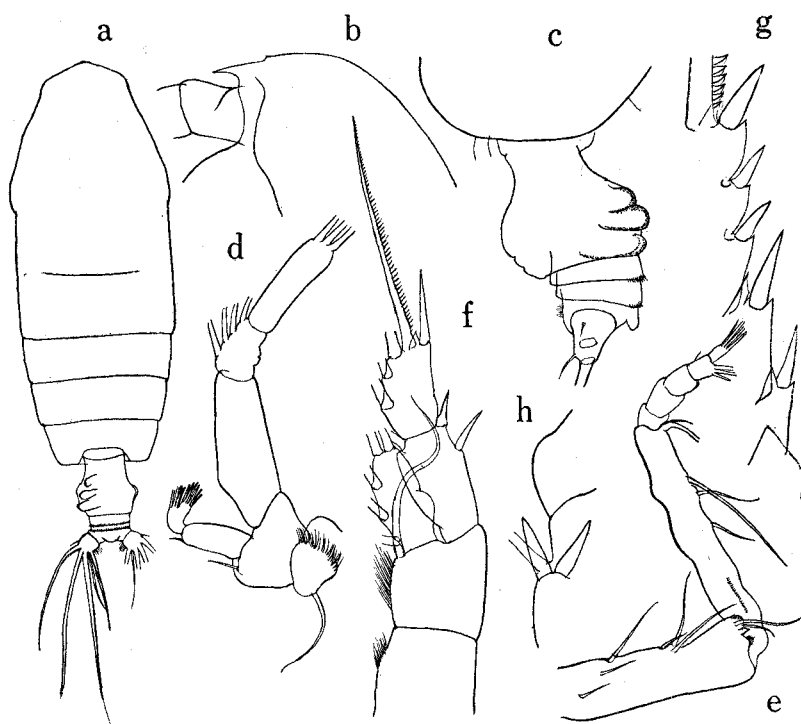


Fig. 49. *Euchiella trigrada* sp. nov.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and genital segment; *d*, second antenna; *e*, maxillipede; *f*, first leg; *g*, outer margin of exopodite of second leg; *h*, inner margin of basal joints of fourth leg.

that of *E. messinensis*; second basal with 3 setae, endopodite with 4 setae, exopodite with 11 setae. Second maxilla as that of *E. rostrata*. Maxillipede with sinuate anterior margin on second basal joint (fig. *e*).

First leg as that of other members of the genus (fig. *f*). Second leg has strong outer edge spines on joints of exopodite (fig. *g*). Terminal spines of exopodite of

second to fourth legs have each 20 teeth. Fourth leg has two subequal spines on posterior surface of first basal joint (fig. *h*).

*Remarks.* The present specimen closely resembles *E. intermedia* WITH but genital segment and first basal joint of fourth leg are quite different from the former.

*Occurrence.* Five adult females from Suruga in the hauls 1000–0 m, Nov. 1937.

*Euchirella areata* sp. nov.

(Fig. 50, *a–h*)

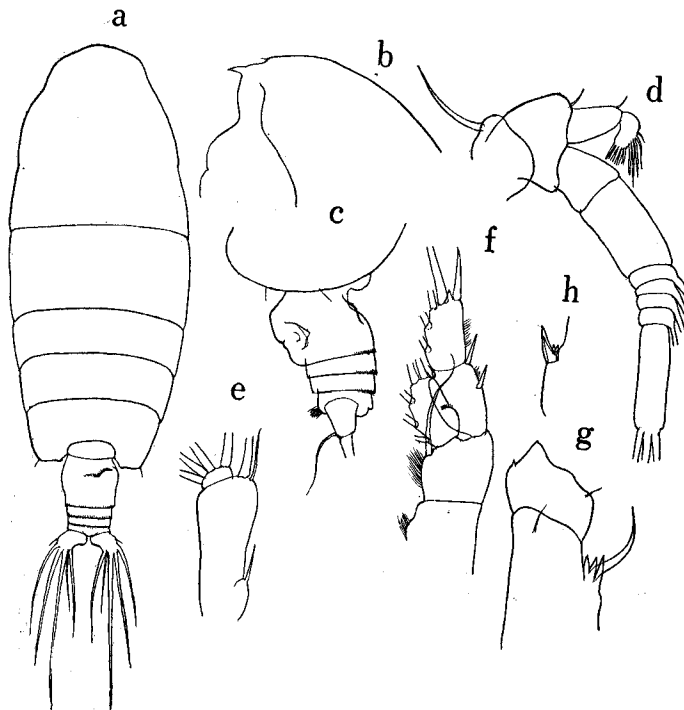


Fig. 50. *Euchirella areata* sp. nov.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, second antenna; *e*, endopodite and second basal joint of first maxilla; *f*, first leg; *g*, basal joints of fourth leg; *h*, inner margin of first basal joint of fourth leg.

*Female.* Length, 3.75 mm: cephalothorax, 3.06 mm; abdomen, 0.69 mm. Cephalothorax oblong ovate. Head separates from first thoracic segment; last two thoracic segments are fused (fig. *a*). Lateral corners of last thoracic segment rounded (fig. *c*). Rostrum small. Frontal organ prominent (fig. *b*).

Abdomen 4-segmented; segments and furca in the proportional lengths 51:13:10:8:18=100. Genital segment asymmetrical; the right side is more inflated on the

lateral margin; dorsal surface is concave at the proximal half, and there is a slight protuberance on the periphery of the hollow on the right side.

First antenna 24-jointed, exceeds distal end of furca by distal two joints; joints are in proportional length:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	50	36	23	23	23	18	23	36	27	27	27	48	50	66	68	70
	18	19	20	21	22	23	24	25								
	66	68	59	50	46	41	41	14=1000;								

joints 8 and 9 are separate on the posterior margin. Second antenna has a very short endopodite about  $1/5$  the length of exopodite; distal joint of endopodite has 10 setae (fig. *d*). Mandible has exopodite a little longer than endopodite (10:8). In first maxilla endopodite has 4 setae, second basal has 2 setae, of which the proximal one is very short (fig. *e*). Second maxilla and maxillipede as those of *E. rostrata*.

First leg has 2-jointed exopodite; first joint of exopodite has 2 outer edge spines (fig. *f*). Second and third legs as those of *E. rostrata*. In fourth leg first basal joint has on the inner face spines of which the outer one is notched at the apex (fig. *g*); the spine of the left fourth leg was broken off, but the indication of bifurcation is slightly observed (fig. *h*).

*Remarks.* The specimen resembles *E. rostrata*, but differs from it in the followings: large size, small rostrum, shape of genital segment, structure of second antenna, and spine of the inner face of first basal joint of fourth leg.

*Occurrence.* One adult female from Sagami in the hauls 1000-0 m, Oct. 1938.

### *Euchirella curticauda* GIESBRECHT

(Fig. 51, *a-g*)

*Euchirella curticauda* GIESBRECHT, 1892, p. 233, t. 15, 36; A. SCOTT, 1909, p. 55; WOLFENDEN, 1911, p. 236; WITH, 1915, p. 118; SARS, 1925, p. 72; FARRAN, 1926, p. 251; SEWELL, 1929, p. 109; WILSON, 1932, p. 59; JESPERSEN, 1934, p. 64; BRODSKY, 1950, p. 176.

*Female.* Length, 3.50 mm: cephalothorax, 3.00 mm; abdomen, 0.50 mm. Line of fusion between head and thoracic segment faintly observed (fig. *a*). Head with median crest; frontal organ prominent; rostrum very short (fig. *b*). Abdomen 4-segmented; segments and furca in the proportional length 52:8:12:8:22=100. Genital segment has lateral projections on each side of genital opening when viewed from the ventral (fig. *c*). Furcal rami 1.6-times as wide as long.

First antenna extends to distal end of last thoracic segment; joint 2 is longer than joints 8-9, which are about as long as joint 13th or 14th. Second antenna with exopodite 4 times as long as endopodite; first joint of exopodite with a process on the inner margin. First maxilla with 9 setae on outer lobe, 11 setae on exopodite, 3 setae on endopodite, 3 setae on second basal, 4 setae on second inner lobe, 4 setae

on third inner lobe. Second maxilla robust and stout. Maxillipede has on first basal joint a knob-like process on the anterior surface near the distal margin.

Second leg with a strong outer edge spine on second joint of exopodite; terminal spine of exopodite with 20 teeth (fig. *d*). Fourth leg with 24 teeth on terminal spine of exopodite; first basal joint has 11 spines on the left, and 8 on the right at the base of inner marginal seta (fig. *e*).

*Male*. Length, 3.14 mm: cephalothorax, 2.45 mm; abdomen, 0.70 mm. General appearance as in the female. Rostrum more distinct. Abdominal segments and furca in the proportional lengths 27:22:19:16:5:11=100. Furcal rami shorter than wide. First antenna extends to distal end of thoracic segment; joints are in the following proportional lengths:

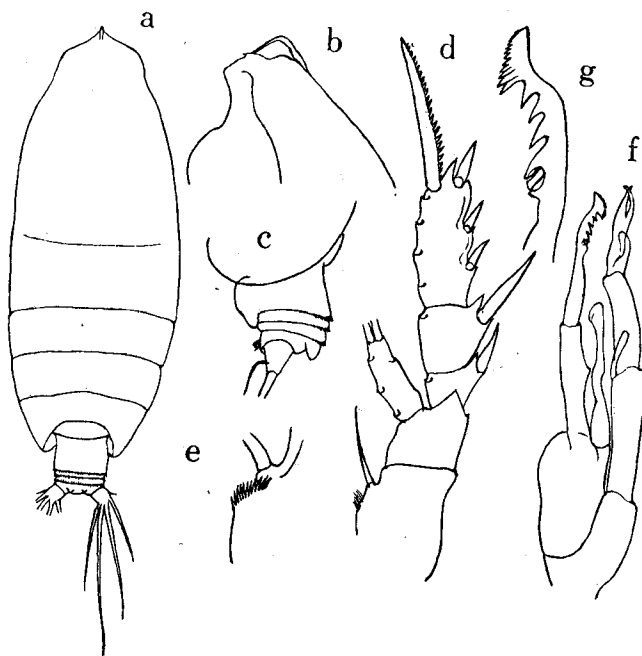


Fig. 51. *Euchirella curticauda* GIESBRECHT.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, second leg; *e*, inner margin of first basal joint of fourth leg; *f*, Male: fifth pair of legs; *g*, distal joint of exopodite of right fifth leg.

Joint	1	2	3	4	5	6	7	8-9-10	11	12	13	14	15	16	17
	66	63	26	23	26	20	30	76	26	70	46	63	60	63	52
	18	19	20	21	22	23	24-25								
	53	60	53	43	46	41	50=1000;								

joints 20 and 21 are fused on the right side. Second antenna with endopodite about

3/4 as long as exopodite. First leg with a slender exopodite. Fifth pair of legs as figured by SARS (fig. f, g).

*Occurrence.* One adult female from Suruga, Dec. 1937, and two males from Sagami, Nov. 1937, in the vertical hauls from 1000 m to the surface.

*Distribution.* The species has a wide distribution in the Pacific, Atlantic, Indian Oceans, Mediterranean Sea and Malay Archipelago.

*Euchirella bitumida* WITH

(Fig. 52, a-e)

*Euchirella bitumida* WITH, 1915, p. 131; SARS, 1925,; FARRAN, 1926, p. 253; VERVOORT, 1949, p. 35.

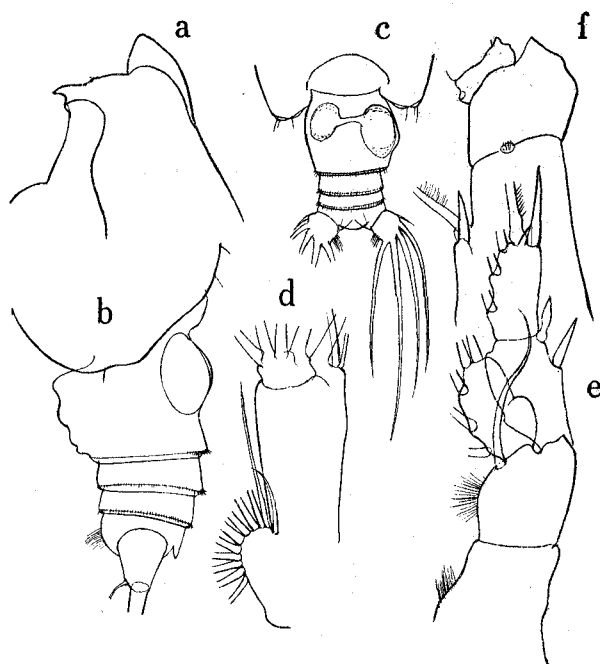


Fig. 52. *Euchirella bitumida* WITH.

a, Female: head, lateral aspect; b, last thoracic segment and abdomen, lateral aspect; c, last thoracic segment and abdomen, dorsal aspect; d, exopodite and endopodite of first maxilla; e, first leg; f, basal joints of fourth leg.

*Female.* Length, 6.07 mm: cephalothorax, 4.95 mm; abdomen, 1.12 mm; so abdomen is contained 4.4-times in the length of cephalothorax. Head is produced into helmet-shaped crista and fused with first thoracic segment (fig. a, c). Lateral corners of last thoracic segment rounded (fig. b). Rostrum short.

Abdomen 4-segmented; segments and furca in the proportional length 50:15:11:12:12=100. Genital segment has two protuberances: the one on the right side is better marked than that on the left; the ventral side of the segment is bluntly produced near the proximal part. First three segments are fringed with fine teeth on the distal border. Furcal rami wider than long.

First antenna extends nearly to distal end of abdomen; proportional lengths of the distal joints are as follows:

Joint	15	16	17	18	19	20	21	22	23	24-25
	22	21	23.5	20	22	18	14	14	11.5	14.

Second antenna with exopodite 3.6-times as long as endopodite. First maxilla with 7 setae on exopodite, 4 setae on endopodite, 3 setae on second basal (fig. *d*). Second maxilla very stout; spine on fifth lobe has peculiar rows of spinules. Maxillipede has second basal joint 1.3-times as long as the first, and is more than 2-times as long as the combined length of joints of endopodite.

In first leg first and second joints of exopodite completely fused; outer edge spine of third joint of exopodite is equal in length to the joint itself (fig. *e*). Second leg with 1-jointed endopodite. In fourth leg inner margin of first basal joint has a moderately long spine at the base of the inner marginal seta; there is a spot furnished with minute spinules on the line of demarcation between first and second basal joints (fig. *e*). The number of teeth on terminal spine of second leg is 21, and that of third leg 20.

*Occurrence.* One adult female from Suruga, Dec. 1937, and two females from Sagami, Nov. 1937 in the vertical hauls 1000-0 m.

*Distribution.* The species, though unrecorded from the Indian seas, appears to be widely distributed in the deep waters of the oceans.

### Genus *Chirundina* GIESBRECHT, 1895

There has only one species *Chirundina streetsi* GIESBRECHT been known until SEWELL (1929) reported the occurrence of the second species, *Chirundina indica*, from the Indian waters; one of which appeared in the Izu region. The genus, closely allied to *Euchirella* and *Undeuchaeta*, has the generic characters in the following: head has a crest; rostrum one-pointed and well developed; lateral corners of last thoracic segment produced backwards into blunt processes; endopodite of second antenna about half the length of exopodite; the spinulation of endopodite of first maxilla not reduced; exopodite of first leg 2-jointed; fourth leg without spine on the inner margin of first basal joint.

#### *Chirundina streetsi* GIESBRECHT

(Fig. 53, *a-i*)

*Chirundina streetsi* GIESBRECHT, 1895, p. 250; FARRAN, 1908, p. 37; A. SCOTT, 1909, p. 43, pl. 7; WITH, 1915, p. 41; SARS, 1925, p. 77; SEWELL, 1947, p. 95; BRODSKY, 1950, p. 180.

*Female.* Length, 5.01 : cephalothorax, 3.95 mm ; abdomen, 1.06 mm. Head with a median crest (fig. *a*, *b*). Rostrum one-pointed and strong (fig. *d*). Lateral corners of last thoracic segment produced triangularly with each a pointed knob at the apex (fig. *c*).

Abdomen 4-segmented ; segments and furca in the proportional lengths 48:19:12:5:16=100. Genital segment is swollen toward the distal end ; ventral surface of the segment has a moderate protuberance just above genital opening. Posterior margin of third segment is fringed with fine teeth. Furcal rami about as long as wide.

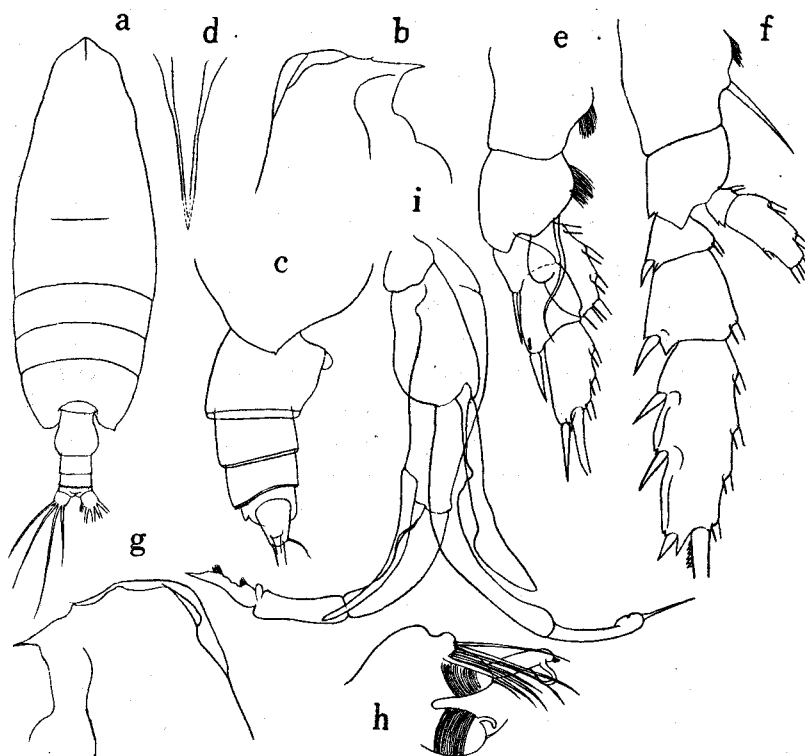


Fig. 53. *Chirundina streetsi* GIESBRECHT.

*a*, Female: dorsal aspect ; *b*, head, lateral aspect ; *c*, last thoracic segment and abdomen, lateral aspect ; *d*, rostrum, anterior aspect ; *e*, first leg ; *f*, second leg ; *g*, Male: head, lateral aspect ; *h*, second maxilla ; *i*, fifth pair of legs.

First antenna 23-jointed, exceeds slightly distal end of furca ; joint 8-9, and 24-25 are fused. Second antenna with exopodite 1.6-times as long as endopodite.

In first leg exopodite incompletely 3-jointed ; the articular membrane between first and second joints is observed distinctly on the anterior surface (fig. *e*). In second leg first joint of endopodite has an accessory tooth (fig. *f*).

*Male.* Length, 4.81 mm : cephalothorax, 3.50 mm ; abdomen, 1.31 mm. Head has



a median crest (fig. *g*). Lateral corners of last thoracic segment rounded. Abdomen 5-segmented; segments and furca in the proportional length 23:32:27:20:7:11=100; second to fourth segments are fringed with fine teeth on the posterior margin.

First antenna extends to the middle of the second abdominal segment; the left one is 21-jointed; the right 20-jointed. Maxillae and maxillipede are reduced; second maxilla as shown in the figure (fig. *h*).

First leg with 3-jointed exopodite and 1-jointed endopodite. Second leg with 33 teeth on the terminal spine of exopodite. Third leg with 24 teeth. Fourth leg with 33 teeth. Fifth pair of legs as figured by Sars (fig. *i*).

*Occurrence.* Two females from Sagami, one female and two males from Suruga, Dec. 1937, in the vertical hauls 1000-0 m.

*Distribution.* It is widely distributed in the Pacific, Atlantic, but has not been reported from the Indian seas.

### Genus *Pseudochirella* G. O. Sars, 1920

The genus was created to accommodate a number of species that were intermediate in character between *Euchirella* and *Undeuchaeta*. The genus resembles *Euchirella* in general appearance, and, especially, in having spines on inner margin of first basal joint of fourth leg. The well-developed endopodite of second antenna shows a close relationship to *Undeuchaeta*. First maxilla has more increased number of setae on endopodite than in *Euchirella*. First and second joints of exopodite of first leg are incompletely fused; endopodite of the second leg incompletely fused. Three species were found in the collection, of which two appear to be undescribed.

### *Pseudochirella pustulifera* G. O. Sars

(Fig. 54, *a-g*)

*Chirundina pustulifera* WITH, 1915, p. 145; *Pseudochirella pustulifera* Sars, 1925, p. 85, pl. 24; WILSON, 1932, *Chirundina pustulifera* WILSON, 1932, p. 49; *Pseudochirella pustulifera* JESPERSEN, 1934, p. 65.

*Female.* Length, 6.26 mm: cephalothorax, 4.95 mm; abdomen, 1.31 mm. Head incompletely separates from first thoracic segment; fourth and fifth thoracic segments are separate (fig. *a*). Rostrum strong, directs backwards; frontal organ prominent (fig. *b*). Lateral corners of the last thoracic segment rounded (fig. *c*).

Abdomen 4-segmented; segments and furca in the proportional length 43:19:14:10:14=100. Genital segment is of characteristic shape: remarkable protuberance on each side of the segment; they are more prominent than those figured by previous authors; second segment is setose on the ventral surface; distal margin of second and third segments fringed with fine teeth; furcal rami as long as wide.

First antenna 23-jointed, extends to distal end of third abdominal segment; joints

8-9, 13-14 are of about equal lengths; joint 19 is the longest. Second antenna with exopodite about 1.6-time as long as endopodite (43:26); posterior surface of first basal joint has a tuft of hairs. Mandible robust, carries 3 setae on second basal joint; biting part has strong teeth. First maxilla has the following number of setae; exopodite has 11 setae, outer lobe has 7+2 setae; first joint of endopodite has 4 setae; second joint has 5 setae; third has setae; second basal 5 setae; third inner lobe has 4 setae and a conical process; second inner lobe has 5 setae. Second maxilla very robust. Maxillipede has a small conical process on fourth lobe of first basal.

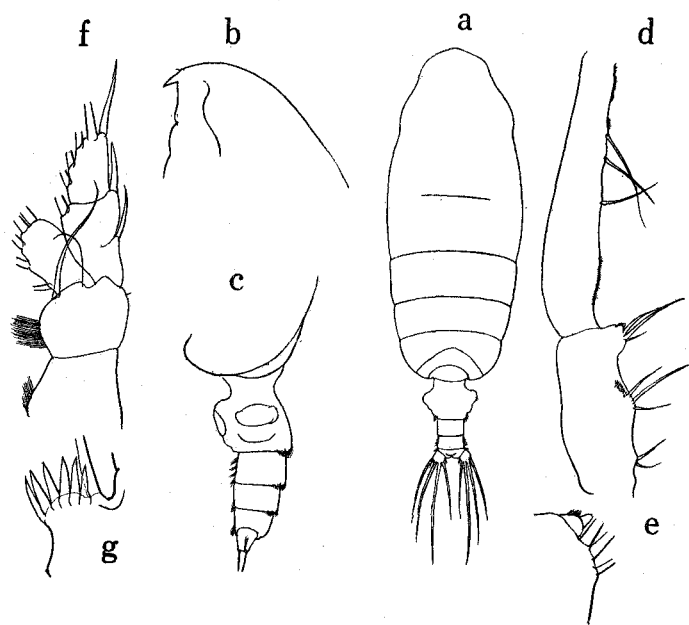


Fig. 54. *Pseudochirella pustulifera* G. O. SARS.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and abdomen, lateral aspect; d, basal joints of maxillipede; e, distal margin of first basal joint of maxillipede; f, first leg; g, inner margin of first basal joint of fourth leg.

In first leg articulation between first and second joint of exopodite is distinct only on the anterior surface. Articulation between first and second joints of endopodite of second leg is observed on the anterior surface; terminal spine of exopodite has about 74 teeth. Fourth leg has six fairly long spines on the inner margin of first basal joint. Some of mouth appendages and swimming legs are of crimson colour.

*Occurrence.* Two adult females from Sagami, Nov. 1937, and one female from Suruga, Dec. 1937, in the vertical hauls 1000-0 m.

*Distribution.* It has been recorded only from the North Atlantic. This is the first record from Japanese waters.

*Pseudochirella polyspina* BRODSKY

(Fig. 55, *a-f*)

*Pseudochirella polyspina* BRODSKY, 1950, p. .

*Female.* Length, 6.28 mm: cephalothorax, 4.90 mm; abdomen, 1.38 mm; the greatest width of cephalothorax, 2.00 mm. Head separates indistinctly from first

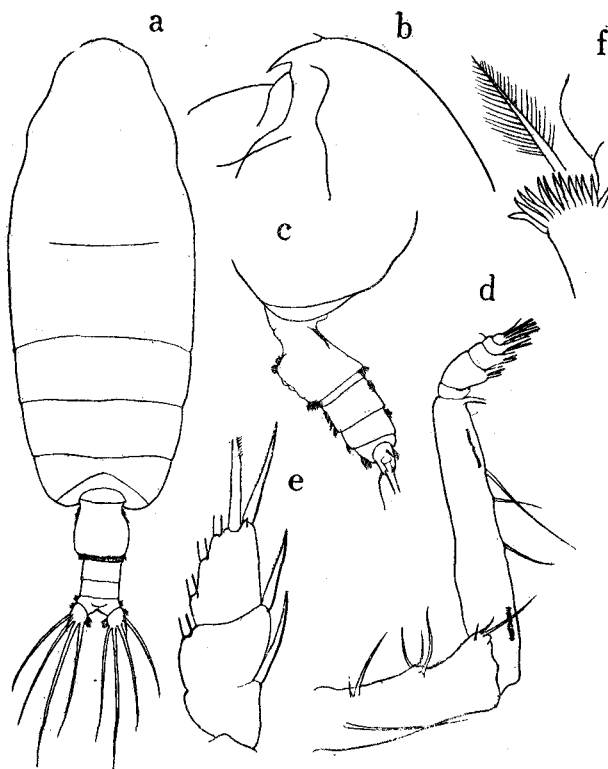


Fig. 55. *Pseudochirella polyspina* BRODSKY.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, maxilliped; *e*, exopodite of first leg; *f*, inner margin of first basal joint of fourth leg.

thoracic segment; last two thoracic segments separate. Lateral corners of last thoracic segment rounded (fig. *a*, *b*). Rostrum moderately long and strong, directs posteriorly. Abdomen 4-segmented; segments and the furca in the proportional lengths 47:20:13:7:13=100. Genital segment is furnished with hairs on the lateral proximal and

distal margins, and also on the ventral side at the base of genital opening, and on the distal ventral margin. Furcal rami about as long as wide (fig. c).

First antenna 23-jointed, extends to distal end of furca; joints are in the following proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	37	46	31	31	34	31	31	50	27	31	27	43	43	50	53	56
	18	19	20	21	22	23	24-25									
	50	65	62	43	50	53	56=1000;									

first joint has a swelling on the posterior margin. Second antenna has exopodite 3/5 as long as endopodite. Mandible has a strong biting part, the tooth on the outer margin is long. First maxilla has the following spinulation: 7 long and 2 short setae on outer lobe; 11 setae on exopodite; 15 setae on endopodite; 5 setae on second basal joint; 4 setae and a small process on third inner lobe; 5 setae on second inner lobe. Second maxilla as that of *P. pustulifera*. Maxillipede has second basal joint 1.5 times as long as the first; anterior distal margin of the joint has a row of spinules, and a double rows of spinules on the proximal margin (fig. d).

First leg has a slender outer edge spine on the joints of the exopodite; first and second joints are incompletely fused (fig. f). Second and third legs have no interesting features. Fourth leg has 13 spines on inner margin of first basal.

*Remarks.* The present specimen, though a little larger than that described by BRODSKY, agrees quite well with his *P. polyspina* taken from the Far-Eastern seas. This is the same species to which I gave a new *P. dura* in the systematic list of the pelagic copepods of the Izu region published in "Records of Oceanographic Works in Japan", N. S., Vol. 1, No. 1, 1953.

### *Pseudochirella tuberculata* sp. nov.

(Fig. 56, a-g)

*Female.* Length 6.10 mm: cephalothorax, 5.00 mm; abdomen, 1.10 mm. Head separates distinctly from first thoracic segment; fourth and fifth thoracic segments incompletely separate (fig. a, b). Lateral corners of last thoracic segment asymmetrical: left side is evenly rounded, but right side carries a rounded process on the postero-lateral margin; lateral corners are furnished with short hairs (fig. c, d). Rostrum strong, directs somewhat posteriorly.

Abdomen 4-jointed; segments and furca in the proportional lengths 49:16:11:6:18=100. Genital segment wider than long, slightly asymmetrical: left side is more inflated than the right. Furcal rami about as long as wide. Abdominal segments and furca very setose.

First antenna 23-jointed, extends to distal end of genital segments; proportional lengths of joints as follows:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	22	26	26	26	30	31	31	53	30	32	30	50	45	55	58	61
	18	19	20	21	22	23	24-25									
	53	74	70	45	53	53	56=1000.									

Second antenna has endopodite slightly longer than half the length of exopodite (19:10). Mandible blade very strong. First maxilla has 5 setae on second basal joint, 15 setae on endopodite, 11 setae on exopodite, 7 long and 2 short setae on outer lobe. Maxilliped has strong setae on fourth and fifth lobes of first basal joint; basal joints and exopodite are in proportional length 42:74:23.

First leg has the joints of exopodite fused between the first and second; outer edge spines slender and long (fig. *e*). Second leg has 2-jointed endopodite articulated

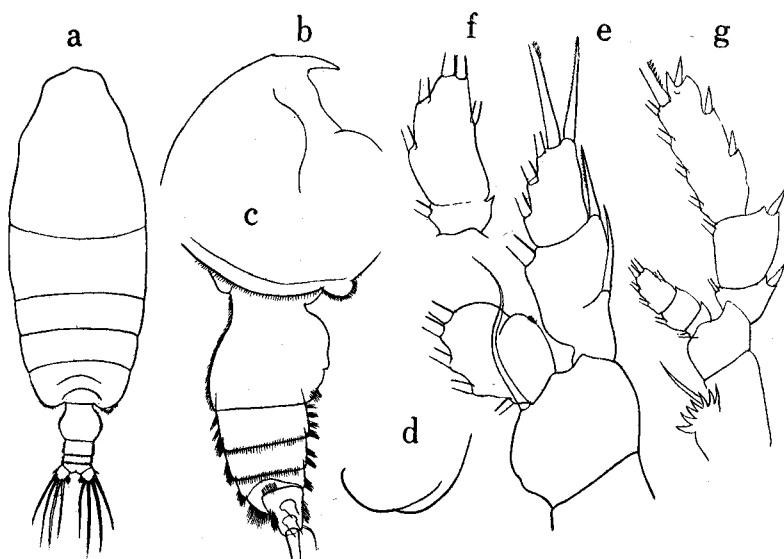


Fig. 56. *Pseudochirella tuberculata* sp. nov.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, last thoracic segment, left side, lateral aspect; *e*, first leg; *f*, endopodite of second leg; *g*, fourth leg.

on the anterior surface (fig. *f*). Fourth leg has 7 long spines on the inner margin of first basal joint at the base of inner marginal seta (fig. *g*).

**Remarks.** The present specimen is quite different from the other members of the genus in the shape of genital segment and lateral corners of the last thoracic segment.

**Occurrence.** One adult female from Suruga, July, 1937, and one female from Sagami, Nov. 1937, in the hauls 1000-0 m.

Genus *Chirundinella* gen. nov.

*Definition.* Cephalothorax elongate ovate; head separates from first thoracic segment; fourth and fifth thoracic segments are fused; head has a median crest; rostrum one-pointed. Abdomen 4-jointed in female; outer marginal seta of furca short; appendicular seta very long. First antenna 24-jointed, joints 8-9 are fused, joints 24 and 25 are separate. Second antenna has exopodite which is longer than endopodite. Mandible has a small endopodite which is slightly longer than half the length of exopodite; biting part robust. First maxilla has 4 setae on second basal joint, 10 setae on endopodite. Second maxilla and maxillipede resemble those of *Pseudochirella*. First leg has 3-jointed exopodite and 1-jointed endopodite. Second leg has 3-jointed exopodite and 2-jointed endopodite. Third and fourth legs have each 3-jointed exopodite and endopodite; fourth leg has a row of bristles on inner margin of first basal joint. Fifth leg absent in the female. Male unknown.

*Chirundinella cara* sp. nov.

(Fig. 57, a-j)

*Female.* Length, 7.44 mm: cephalothorax, 6.00 mm; abdomen, 1.44 mm; abdomen is contained 4.2-times in the length of cephalothorax (fig. a). Lateral corners of last thoracic segment rounded (fig. c). Rostrum as in *Chirundina*; the basal part robust, and directs somewhat posteriorly (fig. b).

Abdomen 4-segmented; segments and furca in the proportional lengths 42:15:12:17:14=100. Genital segment produced moderately below; first three segments are fringed with serrated plates (fig. c). Furcal rami about as long as wide (12:11); appendicular seta about 3-times as long as second inner seta (fig. d).

First antenna 24-jointed, exceeds distal end of furca by distal three joints; joints are in the following proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	67	30	19	19	20	20	23	47	21	23	26	38	40	53	51	55
	18	19	20	21	22	23	24	25								
	57	74	72	57	80	59	40	20=1000;								

joints 3, 7, 9, 18 and 21 are each furnished with a long seta. Second antenna has endopodite a little more than half the length of exopodite (33:52). Mandible has endopodite 3/5 the length of exopodite (25:42); second basal joint has two inner marginal setae (fig. e). First maxilla has 4 setae on second basal joint, 10 setae on the endopodite. The number of setae on second basal joint and endopodite of first maxilla in *Chirundina*, *Pseudochirella* and *Undeuchaeta* are as follows:

	second basal joint	endopodite
<i>Chirundina</i>	5	14
<i>Pseudochirella</i>	5	14-15
<i>Undeuchaeta</i>	5	10

Thus the present specimen agrees with *Undeuchaeta* in the number of setae on endopodite. Second maxilla as that of *Chirundina streetsi*, but the strong seta on fifth lobe appears to be more slender than that of *C. streetsi* (fig. f). Maxillipede has a slender second basal joint; two proximal setae on second basal joint are very closely set

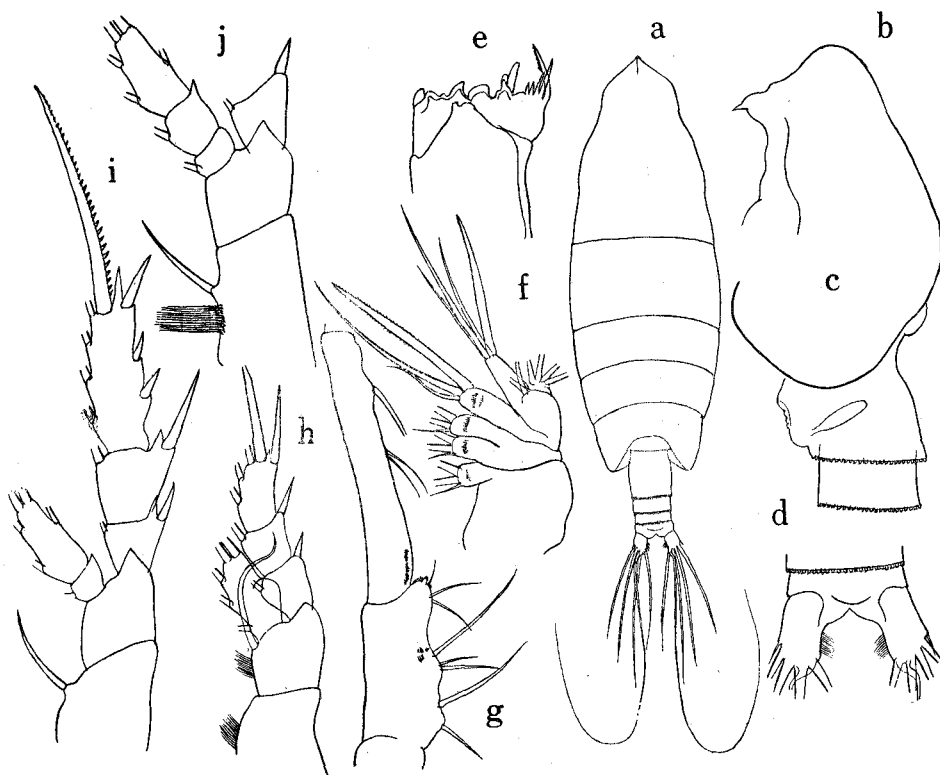


Fig. 57. *Chirundinella cara* sp. nov.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment and genital segment, lateral aspect; d, anal segment and furca, dorsal aspect; e, cutting edge of mandible; f, second maxilla; g, basal joints of maxillipede; h, first leg; i, second leg; j, endopodite and basal joints of fourth leg.

together; there is a row of spinules along the proximal anterior margin of second basal joint (fig. g).

First leg has 3-jointed exopodite; line of demarcation between first and second joints of exopodite is distinct; outer edge spine of third joint of exopodite is the longest (fig. h). In second leg outer edge spine of second joint of exopodite reaches

the level of proximal spine of third joint; terminal spine as long as the combined lengths of the three joints of the exopodite taken together, and has 30 serrations; endopodite distinctly 2-jointed (fig. *i*). Third leg has 3-jointed exopodite and endopodite; terminal spine has 24 serrations. In fourth leg first basal joint has a row of long bristles, about ten in number, on the inner margin near the base of inner marginal seta; terminal spine of exopodite has 22 serrations (fig. *j*).

*Remarks.* The present specimen has a general resemblance to *Chirundina*, and also, in some respects to *Undeuchaeta* and *Pseudochirella*, but appendicular seta, the number of setae on second basal joint and endopodite of first maxilla, and the structure of first and second legs, and also in fourth leg, are the characteristic features which distinguish the species from the other members of the closely allied genus.

*Occurrence.* One adult female from Sagami in a haul 1000-0 m, Nov. 1938.

### Genus *Undeuchaeta* GIESBRECHT, 1888

Up to the present time I have detected three species of the genus: *Undeuchaeta major* GIESBRECHT, *U. plumosa* (LUBBOCK) and the other species which appears to be undescribed. The genus is closely allied to *Chirundina*: head fused with thoracic segment; last two thoracic segments are fused; head with or without crest; last thoracic segment bluntly produced in female, rounded in the male; rostrum one-pointed; furcal rami short, appendicular seta short; first antenna 23-jointed; endopodite of second antenna more than half the length of exopodite; exopodite of first maxilla short, the number of seta on endopodite unreduced; second maxilla as in *Aetideus*; endopodite of maxillipede very short; endopodite of second leg 1-jointed; fifth leg absent in female. In male exopodite of first leg 3-jointed; fifth pair of legs biramose.

#### *Undeuchaeta plumosa* (LUBBOCK)

(Fig. 58, *a-m*)

*Undeuchaeta minor* GIESBRECHT, 1892, p. 228; ESTERLY, 1905, p. 149; FARRAN, 1905, p. 198; FARRAN, 1908, p. 37; *Undeuchaeta plumosa* A. SCOTT, 1909, p. 62; *Undeuchaeta minor* WOLFENDEN, 1911; SARS, 1925, p. 79; FARRAN, 1926, p. 253; FARRAN, 1929, p. 233; WILSON, 1932, p. 61; *Undeuchaeta plumosa* FARRAN, 1936, p. 89; BRODSKY, 1950, p. 181.

*Female.* Length, 3.61 mm: cephalothorax, 2.80 mm; abdomen, 0.81 mm. Head fused with first thoracic segment; fourth and fifth thoracic segments fused. Lateral corners of last thoracic segment asymmetrical: left side is produced bluntly triangularly (fig. *a, b, c*). Rostrum short and stout, directs downwards.

Abdomen 4-segmented; segments and furca in the proportional lengths 45:24:20:2:9=100. Genital segment asymmetrical, carries a dorsal spine on the right margin about the middle, and a row of hairs on the distal corner; left lateral margin



has near the base a low protuberance or something like cement substance which runs posteriorly about to the two-thirds of the segment; the lateral distal corners of the segment are furnished with groups of short hairs. Second segment with spinules on the distal margin. Furcal rami 1.5-times as wide as long (fig. *c, d, e*).

First antenna 23-jointed, extends to distal end of genital segment; proportional lengths of joints as follows:

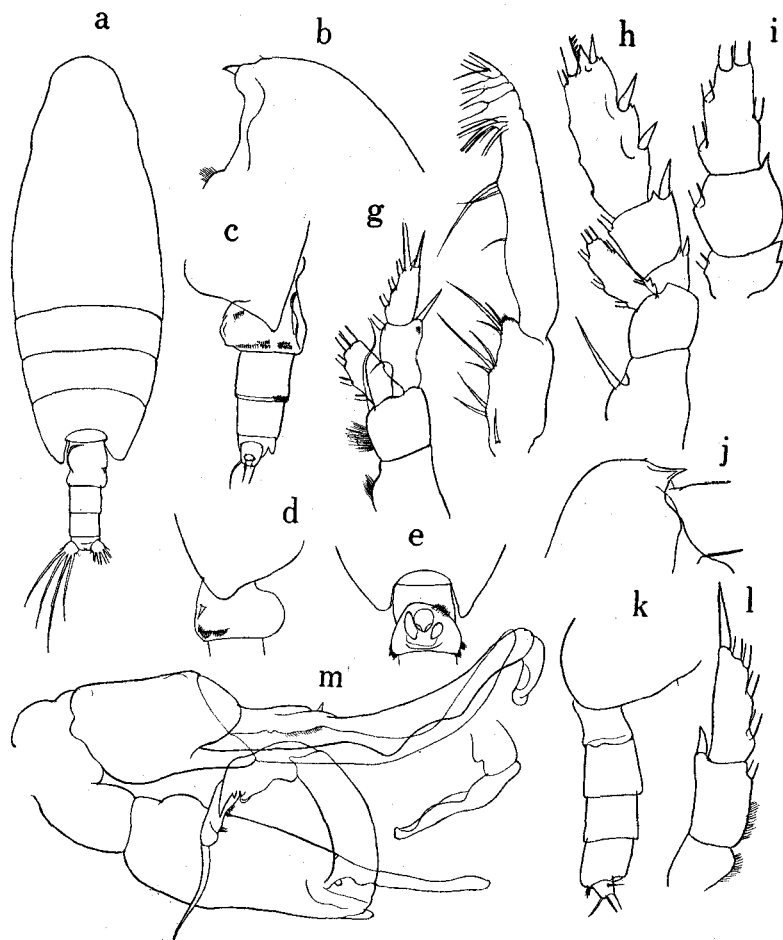


Fig. 58. *Undeuchaeta plumosa* (LUBBOCK).

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, last thoracic segment and genital segment, right side, lateral aspect; *e*, last thoracic segment and genital segment, ventral aspect; *f*, maxillipede; *g*, first leg; *h*, second leg; *i*, endopodite of fourth leg; *j*, Male: head, lateral aspect; *k*, last thoracic segment and abdomen, lateral aspect; *l*, exopodite of first leg; *m*, fifth pair of legs.

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	57	33	33	29	33	33	34	49	33	33	29	52	43	55	60	53
	18	19	20	21	22	23	24-25									
	49	60	52	43	43	49	49=1000;									

joint 17 is the longest; last two joints are of equal lengths. Second antenna with exopodite 2-times as long as endopodite. In first maxilla outer lobe has 9 setae, of which the proximal four are short; exopodite with 11 setae, of which 4 are longer. Second basal joint of maxilliped is about 2-times as long as the first; endopodite is half the length of first basal joint (fig. *f*).

In first leg first and second joints of exopodite fused (fig. *g*). Second leg with 1-jointed endopodite; outer edge spine on proximal margin of endopodite has an accessory tooth (fig. *h*). Third and fourth legs with 3-jointed endopodite (fig. *i*). Terminal spine of exopodite of second to fourth legs with 32, 26 and 26 teeth respectively.

*Male*. Length, 3.45 mm: Abdomen is contained 2.7-times in the length of cephalothorax. Lateral corners of last thoracic segment rounded (fig. *k*). Rostrum short, directs straight downwards (fig. *j*).

Abdomen 5-segmented; segments and furca in the proportional length 23:30:26:20:2:9=100. Anal segment is very short, and concealed beneath the fourth. Second and third segments are furnished with minute teeth on the posterior margin. Second furcal seta about 2-times as long as the others; appendicular seta very short.

First antenna 21-jointed, extends to distal end of last thoracic segment; articular membranes faintly visible between joints 9 and 10, and between joints 12 and 13; joints are in the proportional lengths:

Joint	1	2	3	4	5	6	7	8-9-10	11	12-13	14	15	16	17
	73	43	22	23	26	30	33	73	30	73	40	45	55	60
	18	19	20	21	22	23	24-25							
	56	63	55	45	45	53	56=1000.							

Second antenna and the other mouth parts are not characteristic.

First leg with a short outer edge spine on second joint of exopodite (fig. *l*). In second leg outer marginal spine on second and third joints of exopodite are of equal lengths. Fifth pair of legs are very characteristic as shown in the figure: endopodite of left leg is about as long as first joint of exopodite; in right leg second basal joint is longer than first joint of the exopodite; third joint of exopodite is elongated (fig. *m*).

*Occurrence*. 27 females and 6 males from Sagami, and one female and one male from Suruga in the vertical hauls 1000-0 m, Nov. 1937.

*Distribution*. The species appears to be widely distributed in the oceans, and has been recorded from the Pacific, Atlantic and Malay Archipelago, but not from the Indian seas.

*Undeuchaeta major* GIESBRECHT

(Fig. 59, a-h)

*Undeuchaeta major* GIESBRECHT, 1892, p. 227; ESTERLY, 1905, p. 148; FARRAN, 1905, p. 35; FARRAN, 1908, p. 37; A. SCOTT, 1909, p. 61; WOLFENDEN, 1911, p. 243; WITH, 1915, p. 136; SARS, 1925, p. 81; FARRAN, 1926, p. 254; FARRAN, 1929, p. 233; WILSON, 1932, p. 60; SEWELL, 1947, p. 104; BRODSKY, 1950, p. 182.

*Female*. Length, 4.43 mm: cephalothorax, 3.55 mm; abdomen, 0.88 mm. Head with a median crest (fig. a, b). Lateral corners of last thoracic segment asymmetrical:

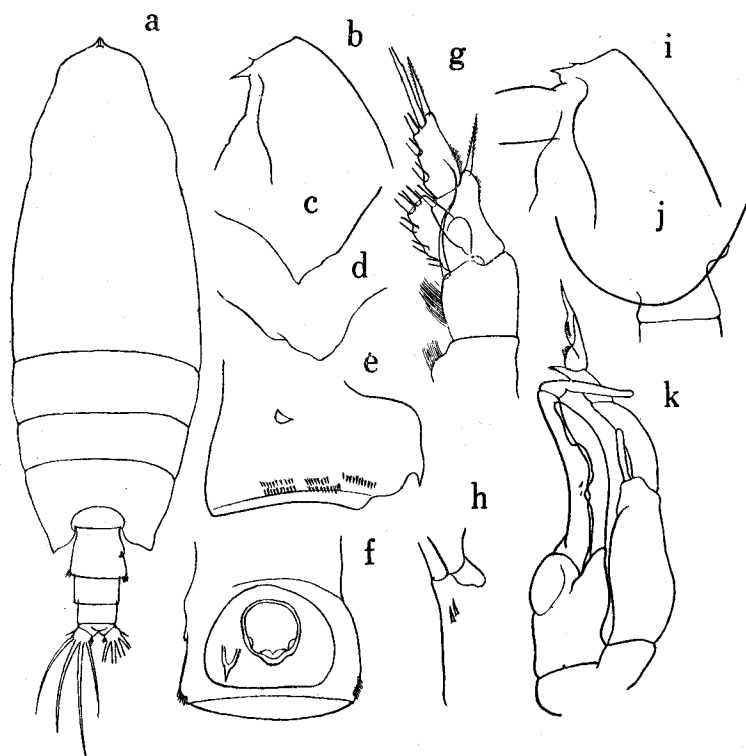


Fig. 59. *Undeuchaeta major* GIESBRECHT.

a, Female: dorsal aspect; b, head, lateral aspect; c, last thoracic segment, and abdomen, left side, lateral aspect; d, genital segment, right side, lateral aspect; e, genital segment, ventral aspect; f, genital segment, ventral aspect; g, first leg; h, inner margin of first basal joint of fourth leg; i, Male: head, lateral aspect; j, last thoracic segment, left side, lateral aspect; k, fifth pair of legs.

right side is not pointed at the apex (fig. e, d). Abdomen 4-segmented; segments and the furca in the proportional lengths 47:23:18:2:10=100. Genital segment asymmetrical: right side has a small protuberance on the lateral margin about the

middle; there is on ventral side of the segment a sharp spine near the genital opening (fig. *e*, *f*).

First antenna 23-jointed, extends to the end of second abdominal segment; proportional lengths of the joints are:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	61	45	27	27	31	31	31	49	27	32	28	49	45	56	61	65
	18	19	20	21	22	23	24-25									
	49	61	53	41	41	45	45=1000;									

joint 17 is more than 2-times as long as the 12th whereas, according to WITH, it is scarcely, not distinctly twice as long as the 12th=second antenna with exopodite about 1.7-times as long as endopodite. Mandible, maxillae as described by GIESBRECHT. Maxillipede has second basal joint 1.7-times as long as the first.

First leg as the description given by WITH (fig. *g*). Fourth leg with two small spines on posterior surface of first basal joint (fig. *h*).

*Male*. Length, 4.12 mm: cephalothorax, 3.06 mm, abdomen, 1.06 mm. Forehead with a median crest (fig. *i*). Lateral corners of last thoracic segment rounded (fig. *j*). Abdominal segments and furca in the proportional lengths 18:28:23:20:3:8=100. Furcal rami as long as wide. First antenna 21-jointed, extends to distal end of second abdominal segment. Fifth pair of legs resemble those of *Undeuchaeta plumosa*; endopodite of left leg is shorter than first joint of exopodite of the same leg (fig. *k*).

*Occurrence*. Four females and two males from Sagami, Nov. 1937 in the hauls 1000-0 m.

*Distribution*. The species is widely distributed in the Pacific, Atlantic and Malayan region.

### *Undeuchaeta magna* sp. nov.

(Fig. 60, *a-f*)

*Female*. Length, 6.07 mm: cephalothorax, 4.89 mm, abdomen, 1.18 mm; abdomen is contained 4.1-times in the length of cephalothorax. Head distinctly separates from first thoracic segment; fourth and fifth thoracic segments are fused (fig. *a*). Forehead with a median crest. Rostrum one-pointed, short, and broad at the base in lateral view (fig. *b*). Last thoracic segment slightly asymmetrical: left side is triangularly produced, and pointed at the apex; right side is irregularly rounded, with a small prominence on the postero-lateral corner (fig. *c*).

Abdominal segments and furca in the proportional lengths 41:21:21:5:12=100. Genital segment has a protuberance which is much larger than that of *U. major*; ventral spine near genital opening is smaller than that of *U. major* (fig. *c*, *d*, *e*). Furcal rami longer than wide.

First antenna extends to the end of furca; joints are in the proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	61	52	30	30	30	33	33	46	31	31	31	46	40	55	61	67
	18	19	20	21	22	23	24-25									
	46	61	52	38	42	44	42=1000.									

Mouth appendages as those of the foregoing species.

Swimming legs not so characteristic. First leg as shown in the figure (fig. *f*). Terminal spine of exopodite of second to fourth legs with 40, 32 and 33 teeth respectively. Spinules on the posterior surface of second basal joint of fourth leg absent (fig. *g*).

*Remarks.* The present specimen, though closely resembles *U. superba* WITH, is distinguished from it in the shape of crest, lateral process of genital segment, and

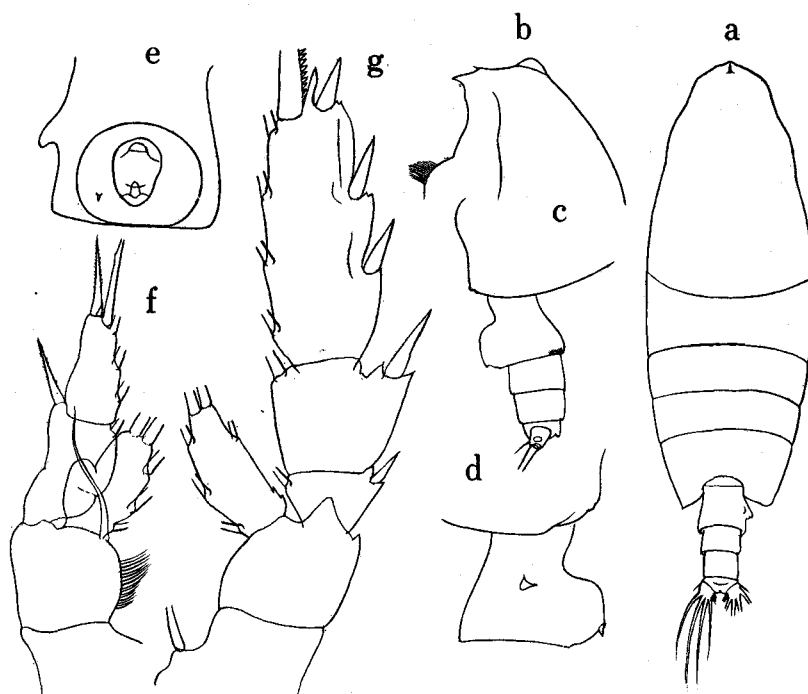


Fig. 60. *Undeuchaeta magna* sp. nov.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, last thoracic segment and genital segment, left side, lateral aspect; *e*, genital segment, ventral aspect; *f*, first leg; *g*, second leg.

absence of the teeth on second basal joint of fourth leg.

*Occurrence.* One adult female from Suruga in the haul 1000-0 m, July, 1937.

### Genus *Valdiviella* STEUER, 1904

Six species of this genus, *Valdiviella brevicornis* SARS, *V. insignis* FARRAN, *V.*

*ignota* SEWELL, *V. minor* WOLFENDEN, *V. oligarthra* STEUER and *V. gigas* (BRADY), have been reported from the Indian seas by SEWELL, one of which *V. oligarthra* was found in the collection. The genus *Valdiviella* was created by STEUER to accomodate a new species which is closely related to *Euchaeta* PHILLIPI, and also to some genera of Aetidaeidae. According to STEUER the genus has the mandible similar in structure to those of *Gaetanus* and *Chiridius*; first maxilla as in *Undeuchaeta*; second maxilla as in *Aetideus*. The genus *Valdiviella* is regarded as a member of the family Aetidaeidae, whereas SARS and A. SCOTT have classed it in the family Euchaetidae. A. SCOTT states "the genus is closely related to *Euchaeta*, but easily recognised by its bifurcate rostrum; the incomplete jointing of the exopodites of the first and second pairs of feet, and indistinctly 3-jointed endopodites of the third and fourth pair of feet are the characters of this genus." He does not mention about the systematic position of the genus. The genus has the following characters: general appearance as in *Euchaeta*; head and first thoracic segments are fused; fourth and fifth thoracic segments are fused; posterior margins of last thoracic segment are rounded; the abdomen 4-jointed; appendicular seta short; endopodite of second antenna about as long as exopodite; endopodite of mandible about as long as exopodite; first maxilla differs from that of *Euchaeta*: setae on the endopodite and second basal joint much reduced; endopodite has only three, second basal has three setae, whereas that of *Euchaeta* has 3+3+3 setae on endopodite, and five on second basal; second maxilla resembles that of *Aetideus*, setae on fifth lobe strong; maxillipede resembles that of *Undeuchaeta* and *Euchaeta*, but row of spinules on the anterior margin of second basal joint are situated on the proximal half, whereas, it is on the distal half in *Euchaeta*, and they are feeble. First leg as in *Euchirella*: first and second joints of the exopodite are fused; endopodite of second leg one-jointed, that of third leg 2-jointed; fourth leg has 3-jointed exopodite and endopodite; fifth pair of legs absent in female; male fifth pair of legs resemble those of *Chirundina*. The genus has a closer relationship to Aetidaeidae in the followings: rostrum resembles that of *Aetideopsis* or *Undinopsis* in its bifurcate form; maxilla has the reduced number of setae on endopodite and on second basal; second maxilla as those of *Aetideus* in having a strong seta on fifth lobe; first legs are similar to those of *Euchirella*; second leg also as in *Euchirella* or *Undechaeta*. The genus has resemblance to *Euchaeta* in the followings: general appearance, and the structure of first antenna, mandible and maxillipede. Thus the genus *Valdiviella* has the generic characters which are in common both to Aetidaeidae and Euchaetidae. It is the intermediate form between *Undeuchaeta* and *Euchaeta*. It seems reasonable, at present, as STEUER stated, to accomodate it in the Family Aetidaeidae.

*Valdiviella oligarthra* STEUER

(Fig. 61, a-g)

*Valdiviella oligarthra* STEUER, 1904, p. 593; WOLFENDEN, 1911, p. 247; SEWELL, 1929, p. 140.

*Female*. Length, 9.57 mm: cephalothorax, 6.38 mm; abdomen, 3/19 mm. Cephalothorax oval; head separates incompletely from first thoracic segment; fourth and fifth thoracic segments are fused (fig. *a*). Lateral corners of last thoracic segment rounded (fig. *b*). Rostrum two-pointed, and short; frontal prominence low (fig. *b*). Abdomen 4-jointed; it is contained 2-times in the length of cephalothorax; segments and furca in the proportional lengths 40:23:19:8:10=100. Genital area indented in lateral view; second and third segments are each furnished with a tuft of hairs on the

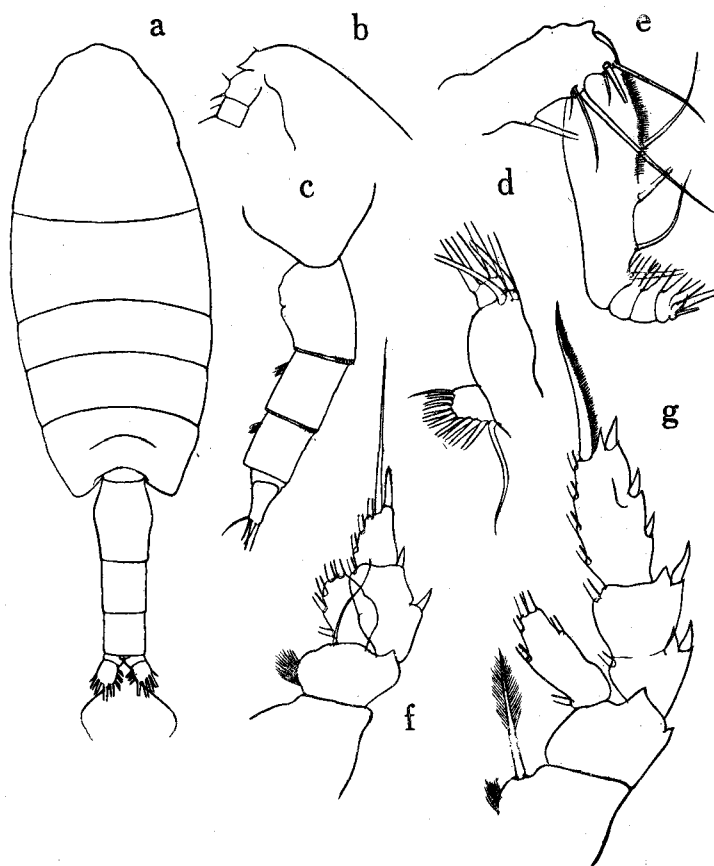


Fig. 61. *Valdiviella oligarthra* STEUER.

*a*, Female: dorsal aspect; *b*, head, lateral aspect; *c*, last thoracic segment and abdomen, lateral aspect; *d*, exopodite and endopodite of first maxilla; *e*, maxillipede; *f*, first leg; *g*, second leg.

ventral side near the proximal margin; first three segments are fringed with fine teeth on the distal margin (fig. *c*). Furcal rami as long as wide.

First antenna 23-jointed, extends to distal end of third thoracic segment when

pressed against the body; joints are in the following proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15	16	17
	49	42	33	39	45	45	36	42	10	13	16	27	27	42	59	65
	18	19	20	21	22	23	24-25									
	45	72	65	52	45	52	59=1000.									

Second antenna and the other mouth parts as described in the generic character. Maxillipede as shown in the figure (fig. *e*).

First leg has 2-jointed exopodite and one-jointed endopodite (fig. *f*). Second to fourth legs have each 2-jointed exopodite; viz. joint 1 and 2 of exopodite are fused; endopodite of second leg one-jointed (fig. *g*); those of third and fourth legs 2-jointed.

*Remarks.* The specimen agrees well with *V. oligarthra*, in having short first antenna, and 2-jointed exopodite in first to fourth legs. In *V. brevicornis* first and second joints of exopodite of first to fourth legs are separate. The specimen from the Indian seas measured 7.2 mm in the female.

*Occurrence.* One adult female from Suruga in a haul 1000-0 m, Nov. 1938.

*Distribution.* The species has been recorded only from the Atlantic and Indian Oceans.